A. Sub-Committee Report - Environmental Observations

I. Introduction

The Eastern Snake Plain Aquifer (ESPA) Advisory Committee has developed a Comprehensive Aquifer Management Plan (CAMP) that sets forth short-term and long-term measures to address declining aquifer levels and insufficient water supplies. The CAMP responds to the overarching goal established by the Idaho Water Resource Board and presented to the Legislature of:

> "Sustain the economic viability and social and environmental health of the Eastern Snake Plain by adaptively managing a balance between water use and supplies."

This document explains the general environmental issues associated with the CAMP, reviews hydrologic analyses prepared for the CAMP, and discusses how environmental considerations can be integrated into CAMP implementation.

II. Background: An Interconnected Hydrologic System

The ESPA is one of the nation's greatest aquifers – covering more than ten thousand square miles and holding several hundred million acre feet of water. This vast aquifer influences or is influenced by the rivers and streams flowing across much of eastern Idaho. In some places, the Snake River and tributaries such as the Big Lost River feed the aquifer through flooding and seepage. In other places, the aquifer feeds the Snake River – most notably at Thousand Springs in the Hagerman Valley.

The wellbeing of the ESPA influences the flow of rivers and streams that are fed by springs that discharge water from the aquifer along a crescent of the Snake River from American Falls to near Bliss. The flow of these springs is great, totaling about 6 million acre feet per year. Spring flows are essential to sustaining many of the aquatic systems of the Snake River. For instance, during the late summer, most of the water flowing in the Middle Snake River downstream of Twin Falls comes from spring discharges from the ESPA. Declines in ESPA can affect both the volume and the quality of water that support the fish and wildlife populations, recreation, and beneficial uses of the Snake

River as well as many smaller spring-fed streams.

Actions to address the decline of the ESPA also have important implications for the environment. The CAMP calls for a wide range of measures such as diverting Snake River flows to recharge the aquifer, converting irrigation in certain areas from groundwater to surface water sources, and reducing groundwater pumping through voluntary incentives. Each of these actions produces distinct changes in the amount and timing of water flow in the Snake River and spring-fed tributaries. Some of the environmental consequences of these hydrologic changes may be positive, some negative, and some mixed.

III. Environmental Analyses Conducted for the CAMP

The ESPA Advisory Committee recognized early in its deliberations that it lacked the time to complete thorough environmental analyses and that, in any case, CAMP proposals would not be detailed enough to permit a precise evaluation of their effects. Given these limitations, the Committee agreed that it would focus on understanding the general relationship between ESPA management and environmental effects.

In February 2008, the Advisory Committee created the Environmental Subcommittee. The subcommittee was charged with the following tasks:

(1) Modeling the hydrologic effects of the various alternative strategies under consideration on Snake River and spring flows;

(2) Discussing the general ecological implications of the model results with the full committee;

(3) Developing a narrative description of the environmental factors and features that could be influenced by ESPA management actions; and

(4) Reviewing recommendations for the environmental provisions of the CAMP.

IV. Hydrologic Analysis

Technical staff with the Idaho Department of Water Resources and Idaho Power

Company collaborated on a series of analyses to predict how alternative ESPA management actions would affect river flows and spring discharge. These analyses are based on the "medium package" that was developed by the CAMP Advisory Committee and that called for a 600 thousand acre foot (kaf) change in the ESPA water budget. These model analyses are described in detail in Technical Document E. The Environmental Subcommittee used these model results to evaluate how various ESPA management alternatives would influence the environment of the Snake River and spring habitats.

It is important to note that not all ESPA actions were modeled due to limited time. Modeling was done in an iterative manner to account for yearly reach gains and included recharge at various locations on the Eastern Snake River Plain. Model runs were based upon those conditions and assumptions developed with CAMP committee. As with all predictive modeling exercises, assumptions are made regarding physical and legal factors that may not occur or that may change. Further analyses will be important to understanding the hydrologic effects of specific ESPA actions as they are developed.

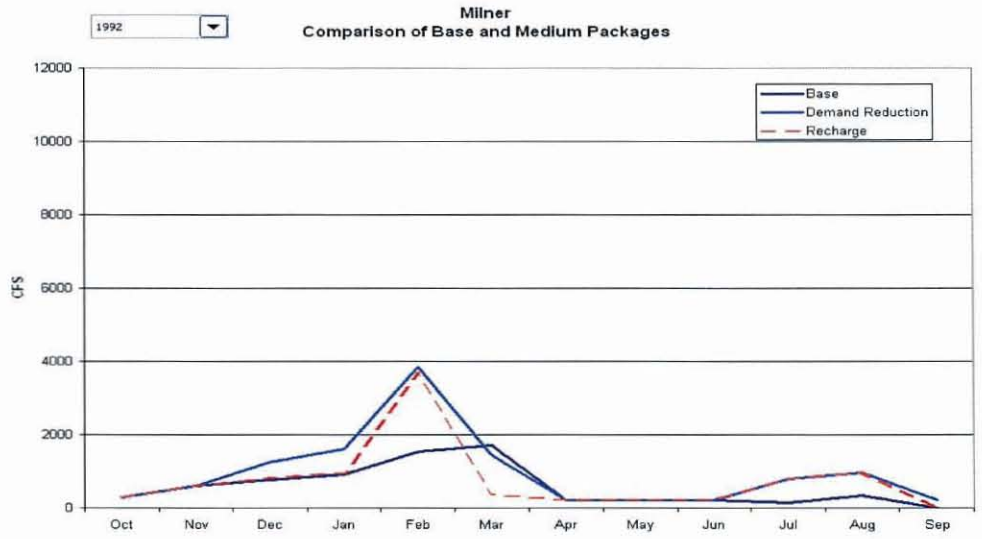
The hydrologic analyses show that the effects of ESPA management actions vary significantly from year-to-year, from place-to-place along the Snake River, and from month-to-month within each year. Therefore, to understand the environmental issues associated with the CAMP, it is necessary examine how ESPA actions affect flows at specific locations under specific runoff conditions.

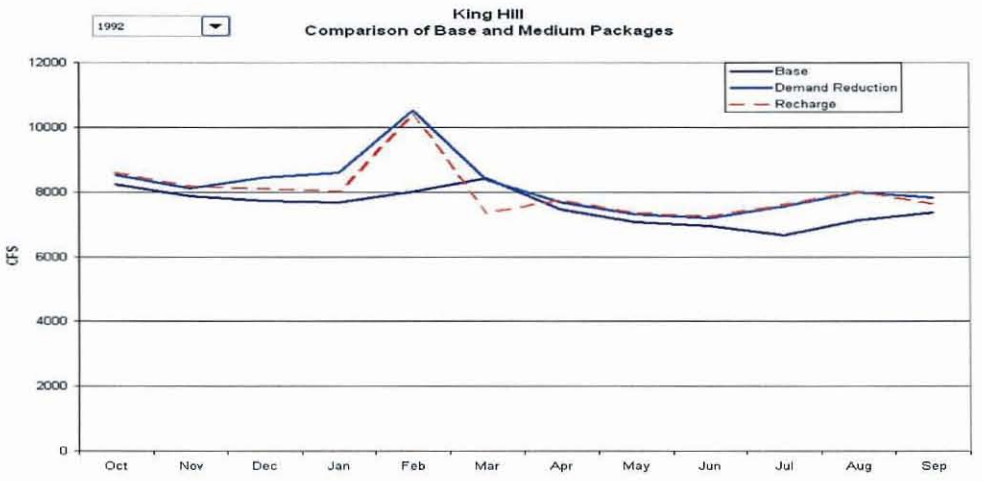
Despite the variability in model results, certain general patterns do emerge. One of these patterns is that the hydrologic modeling analyses predicted no significant change in river flows above Blackfoot attributable to ESPA actions.

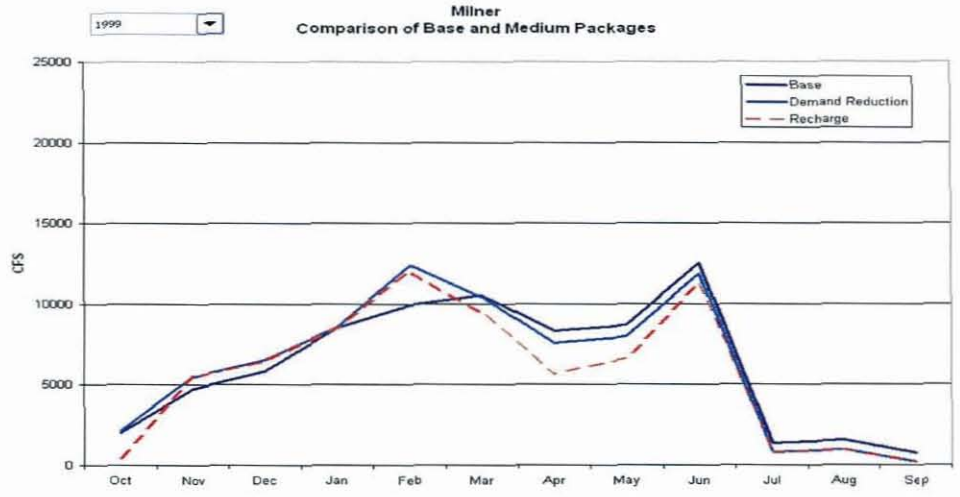
Impacts of ESPA actions were most discernable in the Middle Snake River because large volumes of water used for recharge and conversions are diverted primarily between American Falls and Milner dams. These diversions mostly involve flows that would otherwise pass into the Middle Snake. Therefore, this summary will focus on results for Milner and King Hill – at the upstream and downstream ends of the Middle Snake River.

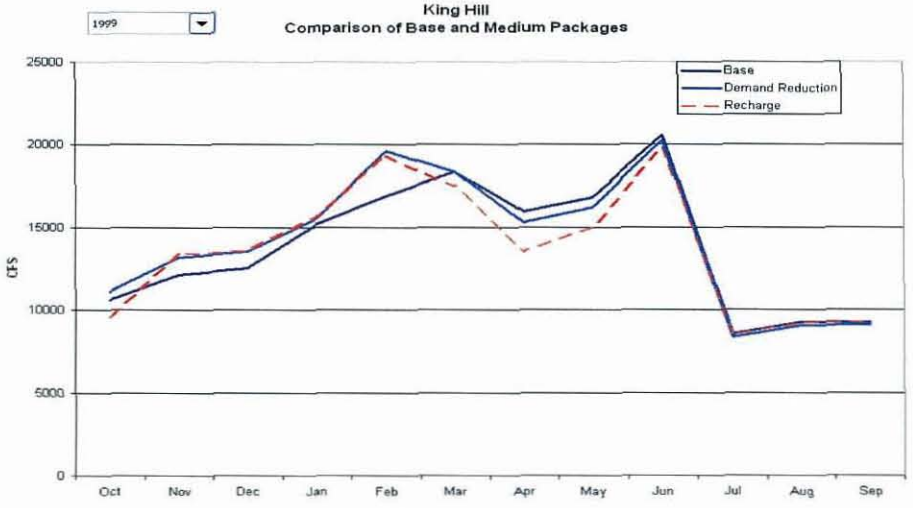
Model analyses of the medium package (600 kaf change in the ESPA water budget) show the relationship between ESPA actions and river flows. The model results show that flows vary significantly over the 26 years of the simulation due to differences in run-off

(ranging from drought to flood) and the timing of ESPA implementation. The model runs for 1992 (a drought year) and 1999 (a normal to high flow year) are illustrative of the range of results.









These results illustrate typical patterns in Middle Snake River flows that recur, with variations, in many of the simulated water years. Conclusions from these analyses include:

- Full implementation of the medium package will increase Middle Snake River flows in the late winter in many years.

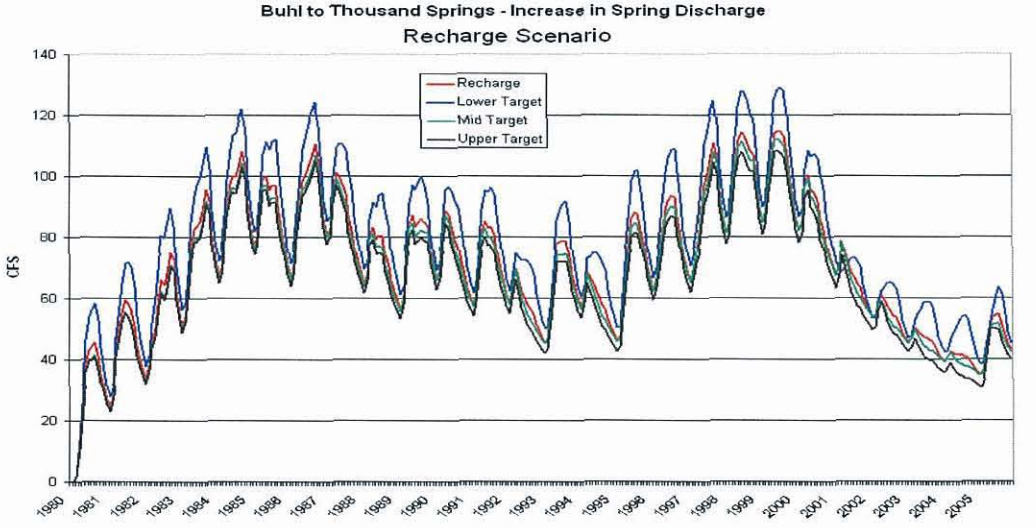
- The "demand reduction" simulation (250 kaf aquifer recharge/conversion; 350 kaf

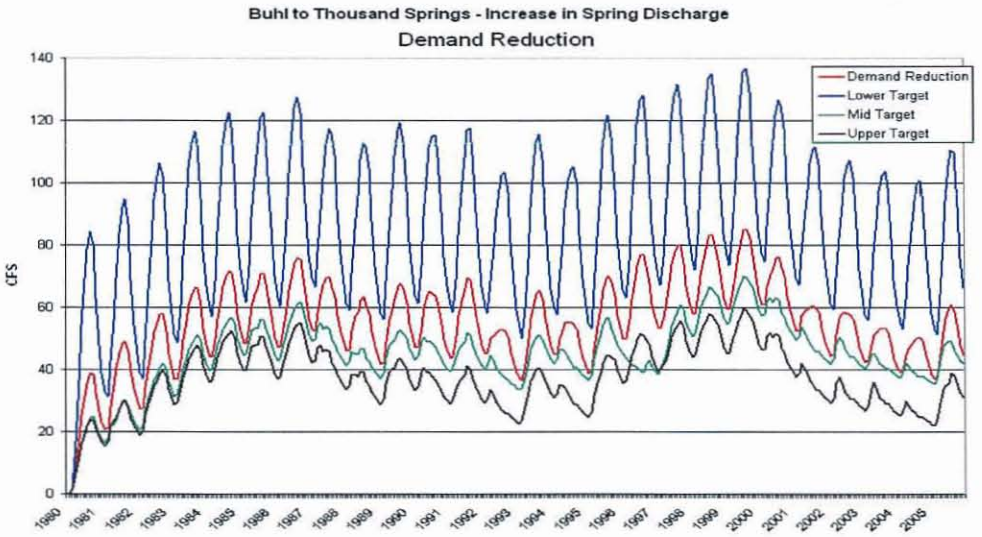
demand reduction) provides somewhat higher flows in many years.

- The "recharge" simulation (500 kaf aquifer recharge/conversion; 100 kaf demand reduction) will reduce springtime flows in the Middle Snake River, particularly in average and above average years. The ecological implications of this reduction in springtime flows are discussed in the next section.

The CAMP will also increase the flow of springs discharging from the ESPA. As explained in Section VII, below, these spring systems provide important fish and wildlife habitat and water quality benefits. The modelers examined how aquifer recharge and demand reduction strategies would affect these springs. For the demand reduction runs, the modelers examined three scenarios for how the reduced pumping demand might be geographically distributed: the upper (northeast) reaches of the ESPA, middle area of the ESPA, and lower (southwest) ESPA. The model runs show increases in spring discharge attributable to CAMP actions relative to a "no action" base case.

Several of the most environmentally significant spring systems are in reach between Buhl and Thousand Springs, including Box Canyon, Blueheart, and Thousands Springs.





These model runs suggest that both aquifer recharge and demand reduction will increase discharge from the springs. The strategy that emphasizes both demand reduction and aquifer recharge produces somewhat higher and more consistent spring discharge than the strategy that emphasizes primarily aquifer recharge. Not surprisingly, a strategy focused on demand reduction in the lower or southwest portion of the ESPA will provide the most benefit to the Thousand Springs reach.

Similar model results for the CAMP Phase I recommendations were not available at the time the advisory committee concluded its last meeting. These model analyses are expected to be completed in the near future. Since Phase I would involve a smaller change in the ESPA water budget than medium package, effects on river flows and spring discharge are likely to be less than those predicted in the model runs discussed above.

V. Summary of Environmental Implications of Hydrologic Analyses

The hydrologic analyses make it possible to reach some general observations about the environmental issues associated with the CAMP recommendations. Key points include:

- None of the scenarios appear to have significant impacts above Blackfoot. This conclusion should be reviewed as specific management actions are designed and implemented.

- CAMP actions are predicted to increase discharge from the springs over the long-term. This will have a positive effect on habitat availability for spring-dependent species and water quality. The significance of the improvement in spring flows depends on the underlying trend in the aquifer's water budget. If the aquifer is stable, these changes will produce a net improvement over the current situation. If the aquifer is declining, spring flows will not necessarily stabilize.

- The CAMP long-term hydrologic goal calling for a 600,000 acre foot change in the ESPA water budget (250-350 kaf recharge/conversion; 250-350 kaf demand reduction) is similar to the medium package/demand reduction simulation, which predicted relatively few negative impacts on river flow and flow benefits in some years. Actual effects of ESPA actions will depend on which specific measures are implemented.

- The aquifer recharge package (500 kaf recharge/conversion; 100 kaf demand reduction) would reduce flows in the Middle Snake River compared with the CAMP long-term recommendation and the base case. Reduced flows are most discernable in springtime during high flow years and in the Milner to Shoshone Falls reach. The environmental factors and features that may be affected by this change include: (1) white sturgeon, (2) water quality, (3) general health of the aquatic ecosystem, including flushing and scouring of channels and macrophyte beds; and (4) recreation.

- The predicted hydrologic changes occur in an important context: the Middle Snake River is already under stress due to low flows in many years.

VI. Integrating Environmental Considerations into CAMP Implementation

The CAMP charts a course for the future of the Eastern Snake Plain Aquifer. But, the CAMP is, of necessity, a general policy document with few details. Implementing the actions that will stabilize the ESPA will require a sustained effort carried out over many years. As these actions are developed, it will be important to analyze their implications for the environment of the Snake River and its tributaries.

For this reason, the CAMP recommends that environmental issues be integrated into CAMP implementation. This means assessing affects of ESPA actions and developing

measures and strategies for addressing those impacts. It became clear during the Advisory Committee's deliberations that managing the ESPA opens opportunities to enhance environmental values and to minimize any adverse effects. For instance, the CAMP encourages efforts to find water for aquifer recharge in a manner that also provides upstream fish and wildlife benefits.

As part of this effort to integrate environmental considerations, the CAMP calls for a coordination forum that will bring diverse interests together to share information and to recommend operational strategies that can benefit fish and wildlife while meeting ESPA objectives, water rights, and storage contracts.

The Advisory Committee discussed the cooperative forums on the South Fork of the Snake River and Henry's Fork as potential models for designing such a coordination process. Those cooperative forums have the following features: (1) they are relatively informal; (2) although informal, they are regular insofar as meetings are scheduled at key points in the water year and there is timely sharing of information; and (3) they permit parties to ask questions and recommend specific river operations. In the case of the South Fork, the participants' ability to work together was aided by scientific research that better defined the needs of Yellowstone cutthroat trout and revealed opportunities to benefit the fish without impairing irrigation storage. The key to the success of these cooperative forums is that they give participants the right information at the right time and allow them to discuss recommendations directly with river managers.

The CAMP does not prescribe specific procedures for integrating environmental considerations into CAMP implementation. That issue is left to the Water Resource Board and state policy makers. Of course, simply developing such procedures does not by itself protect the environment. The tests for determining the success of this effort are whether ESPA actions are implemented in ways that avoid significant harm to the Snake River, whether impacts are assessed and minimized, and whether opportunities to enhance fish and wildlife values are pursued when feasible.

VII. Environmental Factors and Features

The Advisory Committee was provided a description of the environment of the Snake River entitled "Environmental Factors and Features." This document was intended to serve as a checklist of issues to be considered as actions are implemented and as an aid in

the developing monitoring and adaptive management plans. The document does not attempt to evaluate or otherwise describe the effects of ESPA actions. The full document is at the Idaho Department of Water Resources' CAMP website at: http://www.espaplan.idaho.gov/espa-presentations.htm. The following is a summary of key points in the document.

A. Springs: Devils Washbowl through Thousand Springs

Fish and Wildlife: Spring-fed creeks and spring water mixing zones or "estuaries" in the Snake River provide high quality habitat for native aquatic species, including redband trout, Shoshone sculpin and several rare snail species.

Water Quality: These springs discharge cool and clean water that is critical to maintaining the water quality of the Middle Snake River.

Recreation and Aesthetics: The springs of the Mid-Snake River are a popular attraction for visitors and sight-seers. Hunting and fishing are popular in spring creeks and pools.

B. Middle Snake River

Fish and Wildlife: Redband trout, Shoshone sculpin and white sturgeon that inhabit this reach are state-listed sensitive species. Five species of snail that reside in the Middle Snake River or associated springs are listed as threatened or endangered under the Endangered Species Act. Habitat quality in this reach has been affected by altered flow regimes and water quality problems. Periodic high flows during the spring are important for successful sturgeon spawning and early development as well as the general health of the aquatic environment and riparian areas.

Water Quality: Several different segments of the Middle Snake River have been designated as water quality limited by the State of Idaho. The Department of Environmental Quality has or will develop pollutant budgets known as Total Maximum Daily Loads (TMDLs) for this reach for the following pollutants: phosphorus, sedimentation/siltation, fecal coliform, and temperature. Implementation of TMDLs has led to significant efforts and financial investments by fish farms, municipalities, Idaho Power Company, and irrigated agriculture. River flows help the river's ability to assimilate and flush pollutants through the system, improving water quality and the

effectiveness of the TMDLs.

Recreation and Aesthetics: The Middle Snake River has several scenic waterfalls and cataracts, including Shoshone Falls. This area also has several popular boating runs, including the Hagerman reach, the Bliss reach, and the Murtaugh section. Fishing activity is focused mainly on rainbow trout and sturgeon. Waterfowl hunting is also popular in this area.

C. Snake River from American Falls to Milner Dam

Fish and Wildlife: The river fishery in this reach is dominated by non-native species (rainbow and brown trout) along with native mountain whitefish. The reservoir fisheries are predominated by non-native warm and coldwater game fish. Native species include the Yellowstone cutthroat trout, Paiute sculpin, and mottled sculpin.

Water Quality: Water quality issues are similar to the Snake River below Milner Dam. TMDL pollutants include: nutrients/eutrophication biological indicators and sediment/siltation. The river below American Falls Dam occasionally experiences very low dissolved oxygen levels

Recreation and Aesthetics: The reservoirs and riverine portions of this area support popular recreational fisheries. Massacre Rocks State Park, Lake Walcott State Park and the Minidoka National Wildlife Refuge are located in this reach of the river. Lake Walcott and Milner Pool are for popular sport fishing and are two of the most heavily used waters for bass tournaments.

D. Snake River – Blackfoot to American Falls Reservoir

Fish and Wildlife: The fishery in this reach is primarily supported by hatchery reared rainbow trout, with Yellowstone cutthroat and mountain whitefish also present. Portions of this river reach are highly braided, where much of the habitat is located in side channels. A number of large springs discharge into American Falls Reservoir.

Water Quality: TMDL pollutants for this reach include sediment/siltation for American Falls Reservoir and the Snake River, mile 791 to American Falls.

Recreation: Recreational use consists primarily of sport fishing, waterfowl hunting and boating.

E. Snake River above Blackfoot

Fish and Wildlife: The South Fork Snake, Henry's Fork and portions of the Snake support significant population of native Yellowstone cutthroat trout as well as rainbow trout, brown trout and mountain whitefish. The health of these trout populations is influenced by releases from Palisades Dam on the South Fork and Island Park Dam on the Henry's Fork. The cottonwood gallery forest along the South Fork, lower Henry's Fork and mainstem Snake below the confluence is one Idaho's most significant terrestrial habitats. The health of this forest and riparian areas depends on adequate flow conditions, including periodic high spring flows and inundation.

Recreation and Aesthetics: These reaches are exceptionally popular with anglers, boaters and other recreationists.

F. Other Factors and Features

The foregoing list focuses on river reaches and spring systems that may be influenced by flow changes due to ESPA management actions. Other factor or features that may need to be considered during plan implementation include:

Areas Potentially Affected by New Storage: Impacts of new dams on affected river reaches should be considered as the feasibility of such projects is evaluated.

ESPA Water Quality: Any effects of aquifer recharge operations on ESPA water quality should be considered.

Flow Augmentation for Salmon: The upper Snake River system has contributed water to augment the flow during the migrations of Snake River chinook salmon.